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UTILITY Patent Specification

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Title: COMPRESSIBLE SHOT SHELL

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TECHNICAL FIELD of the INVENTION

The present invention relates to shot shells such as would be utilized in a shotgun or the like, wherein the cartridge forming the shell has a collapsible extension removably engaging the shot end of the cartridge, the
10 cartridge configured to provide a un-compressed length of, for example, 2.50 inches (the minimum length of shell for conventional automatic or semi-automatic, magazine fed shotguns. The collapsible extension is configured to be compressed when placed in a spring-fed magazine, so as to provide increased magazine capacity when compared to standard length shells, while
15 expanding when removed by from the magazine during a loading cycle, so as to facilitate reliable placement of the shell into the breach from the magazine.

The collapsible extension in the loaded cartridge of the present invention is configured to be ejected from the barrel upon firing of the cartridge. The present system thereby provides a means to increase the
20 capacity of conventional automatic or semi-automatic (i.e., pump actuated) shotguns, while reducing the likelihood of jamming or malfunction due to

5 utilizing shells which are shorter than the firearm was designed to process.

BACKGROUND OF THE INVENTION

Standard shotgun shells for the 12 Gauge Shotgun vary in length from 2.5 inches to 3.00 inches, which can generally be fired from a standard semi-automatic pump or automatic shotgun.

10 3.25 to 3.75 inch magnum shells are also available for special guns designed to handle such size shells.

A limitation of standard shotguns relates to the amount of shells the magazine can hold, with the ordinary pump holding 4-5 shells maximum, as the magazine tube where the shells are stored is only typically about 14-16 inches long. There are magazine extenders available, but these only allow 15 for an additional two or so shells, awkward to use because of the increased length of the magazine, can extend beyond the barrel, and can make the firearm unreliable.

The original length of the 12 gauge shell was believed to have been 20 developed over 100 years ago, and was necessary because of the amount

5 of powder required for the load. However, advances in black powder has resulted in substantially more power utilizing less powder. Consequently, as shown in Figure 1, todays typical shell has a wad having a substantial cushion (8) which acts as a spacer between the lesser amount of powder (4) and the shot (2).

10 Because of advances in propellants including "smokeless powder" and the like, it is now possible to provide a "mini" shotgun shell (Fig 2) having a length of, for example, 1.75 inches. Such a shell is already sold by the Aquila company of Mexico.

15 A problem with these "short" shells is that they cannot be used with a conventional automatic or pump action shotgun, because of their length. While they can be loaded into the magazine, allowing perhaps as much as twice the capacity of shells when compared to the longer shells, when the shells are moved one at a time by the firearm from the magazine to the firing chamber, the shorter shells jam because they tend to roll in the "litter" that is, 20 the loading area between the magazine and the firing chamber.

 One solution would be to design a firearm which would shoot these types of shells. However, a better solution would be to design a shell which

5 stores like a "short" shell in the magazine, but loads like a conventional shell when moved from the magazine to the firing chamber, which shell could be used in conventional, off the shelf automatic and pump shotguns.

Patent 5,171,934 issued 1992 teaches a "shortened shot shell having a reduced length that allows one or more extra rounds to be carried in the
10 magazine of the standard shotgun" and teaches a longer wadding "that avoids tilting or tumbling of the wadding" in the barrel after firing, but does not teach the extension end of the present invention.

Patent 6,427,600 teaches a "blank cartridge for self loading guns" wherein there is provided a "bullet-like projection being retractable.. When the
15 cartridge is fired" to facilitate recycling of the firearm. This is relevant in that the structure of the cartridge anticipates a telescoping front end, albeit for a different purpose than that taught in the present, searched for invention.
PCT/B94/01779 is the PCT case on the above '600 patent.

Patent 5,341,744 is referenced as it contemplates a plastic foam
20 extension (26) emanating from the front end of the cartridge. See also 3,865,038.

Patent 5,677,505 teaches a "reduced energy cartridge" having a

5 recoiling inner piston, although for a different purpose than that contemplated
in the present invention.

German patent 96460 teaches some interesting structure of a shot shell
cartridge, but have had difficulty in translating.

Patent 6,250,228 teaches a “compression shotgun cartridge” having a
10 “compressible compression cup”, but does not appear to teach the concept
of the present invention.

GENERAL SUMMARY DISCUSSION OF THE INVENTION

The present invention provides a cartridge which is partially collapsible
along its length, so as to facilitate increased shot shell capacity in the
15 magazine in a firearm, while allowing cycling of a shortened shell in a
conventional automatic or semi-automatic firearm.

The shell of the preferred embodiment of the present invention
comprises a cartridge having a length having a breach end and a shot end,
the cartridge being shorter in length than conventional shotgun cartridges, for
20 example, 2.25 inches.

5 A principle improvement of the system relates to a collapsible extension
removably engaging the shot end of the cartridge to provide an uncollapsed
length of, for example 2.50 inches (the minimum length of shell for
conventional automatic or semi-automatic, magazine fed shotguns), the
collapsible extension compressing when placed in a spring-fed magazine to
10 provide maximum magazine capacity, while expanding during loading to
facilitate reliable placement of the shell into the breach from the magazine.

The collapsible extension is configured to be ejected from the barrel
with the firing of the cartridge. The present system thereby provides a means
to increase the capacity of conventional automatic or semi-automatic (i.e.,
15 pump actuated) shotguns.

Shortened shot shells for shotguns are sold on the market, Aquila being
one known manufacturer, but such shells cannot be fed via conventional
magazine in automatic or semi-automatic shotguns due to their length, which
is considerably less than the minimum 2 3/4 length of most such guns.

20 Further, many manufacturers now make guns which require a minimum
shell length of 3", with 12 gauge shells having lengths as long as 3 3/4". The
increase in popularity of these longer shell lengths may be the result in the

5 mandated utilization of shell shot in waterfowl hunting, which has a lesser mass than lead, and is thereby less effective than lead shells of the same size.

The shortened shells provide more rounds with lesser weight, and would be beneficial for utilization in a conventional magazine, but for the design
10 limitations imposed in getting the shell from the magazine, through the litter, into the breach.

The system of the present invention would be of great use to security forces and the military, as the shorter shell could be configured to provide sufficient firepower for the application, while providing increased magazine capacity.
15 Also, the present shell could be versatile in the type of load it carries, and would be compatible with almost all loads, including buckshot, b-b, sabot, slug, etc.

The present invention therefore provides a shell which has a length about the same as a conventional shell, except that it compresses in the
20 magazine to a size perhaps 1/4 to ½ the original size, so as to allow greater magazine capacity, but when the shell is removed from the magazine by the loading mechanism of the firearm, it expands to full length for proper loading.

5 It is therefore an object of the present invention to provide a cartridge which is compressible along its length.

It is another object of the present invention to provide a shot shell cartridge having a collapsible material emanating from the shot end which allows compact storage in a conventional magazine, but effectively lengthens
10 to the minimum length shell size for proper placement from the magazine to the breach.

It is another object of the present invention to provide a shortened shot shell which increase the capacity of conventional firearms, while facilitating reliable cycling of same, with no modification to the firearm.

15 Lastly, it is an object of the present invention to provide a shortened shot shell having a collapsible extension which increases in length when in an un-compressed condition, to a length sufficient for cycling from the magazine to the firing chamber by a conventional firearm.

5

BRIEF DESCRIPTION OF DRAWINGS

For a further understanding of the nature and objects of the present invention, reference should be had to the following detailed description, taken in conjunction with the accompanying drawings, in which like parts are given like reference numerals, and wherein:

10 Figure 1 is a side, cut-away view of a conventional prior art shot shell.

Figure 2 is a side, cut-away view of a prior art short shot shell.

Figure 3, is a side, partially cut-away, partially cross-sectional view of the preferred embodiment of the present invention, illustrating a short shot shell having mounted at its load end a compressible spring.

15 Figure 4 is a partially cut-away, partially cross-sectional view of an alternative embodiment of the present invention, illustrating a short shot shell having mounted at its load end a compressible member.

Figure 5 is an isometric view of a third embodiment of the present invention, illustrating a short shot shell having emanating therefrom a
20 compressible spiraled member formed from polymer or the like.

Figure 6 is a side, partially cut-away view of the invention of Figure 5.

Figure 7 is a side, partially cut-away, partially cross-sectional view of

5 a fourth alternative embodiment of the invention, illustrating a short shot shell having emanating therefrom a compressible accordion-configured member of polymer formed from polymer or the like.

Figure 8 is a side, partially cut-away, partially cross-sectional view of the invention of Figure 7.

10 Figure 9 is a side view illustrating a user loading the compressible shot shell of the present invention into the magazine of the firearm.

Figure 10 is a side, partially cut-away view of the fifth embodiment of the present invention, illustrating a short shot shell having emanating therefrom a compressible foam encapsulated by a compressible polymer layer, in an
15 uncompressed state.

Figure 11 is a side, partially cut-away view of the invention of Figure 10, illustrating the compressible foam encapsulated by a compressible polymer layer, in a compressed state.

Figure 12 is a side, partially cut-away view of the sixth embodiment of
20 the invention, illustrating a short shot shell having emanating therefrom a compressible foam portion.

Figure 13 is a side, partially cut-away view illustrating a firearm having

5 a plurality of compressed short shells of the present invention therein, and a single un-compressed shot shell of the invention in the firing chamber.

Figure 14 is a side, partially cut-away view illustrating a fired shell casing of the present invention ejecting from the firearm, whilst simultaneously an compressed shot shell is removed from the magazine, and
10 uncompresses to a full shell length, for proper manipulation and placement into the firing chamber of the fire arm.

Figure 14A is a side, partially cut-away view of the an alternative shot shell of that illustrated in Figure 14, wherein the uncompressed outer portion remains with the shell as it is ejected, as opposed to being fired out of the
15 barrel with the load.

Figure 15 is a side, partially cut-away view of a conventional firearm having conventional shot shells loaded therein, with a maximum illustrated load of five shells.

Figure 16 is a side, partially cut-away view of a conventional firearm
20 having exemplary shot shells of the present invention compressed in the magazine, providing an increased load of seven shells.

Detailed Discussion of the Invention

Figure 1 illustrates a conventional prior art shotgun shell or shot shell 1 having an overall length 10 of about 2.5 inches, comprising a tube 3 forming an enclosure 14 having first 2, and second 2' ends, the first end containing a primer 7 surrounded by a base wad 11, which primer is configured to ignite propellant or powder 6, which urges shot 4, supported and cushioned by wad 5 from shell, upon firing from a firearm. Wad configurations vary depending upon application, but in a conventional shell as shown, a cushion 8 having a head 9 engaging the powder is provided, not only to cushion the shot, but also to function to fill space.

A shot cover 13 is provided to seal the shot in the tube at its load or shot end, which cover is held in place via a crimp 12 in the case of a separate cover, or alternatively forming a cover utilizing the tube by crimping the ends of the tube inward to seal same.

When the shell is fired, the separate shot cover is fired from the firearm with the shot, while in the alternative method of crimping the ends of the tube,

5 said ends become un-crimped and return to a tube configuration to allow the
shot to pass therethrough.

The cushion 8 may be utilized in modern conventional shells because less powder 6 or propellant is necessary, when compared to the black powder used when the shot shell was first developed.

10 A typical prior art short shot shell 1', such as the 12 Gauge short shell manufactured by AQUILA of Mexico is shown in Figure 2. It contains most if not all of the components of a traditional length shell in a tube only 1.5 inches in length.

As shown, the short shot shell forms an enclosure 14' having a base 15 having a primer 7' surrounded by a base wad 11', configured to ignite the propellant or powder 6', which urges wad 5' (which may include cushion 8' and head 9') to push shot 4' from the shell and out of the barrel of the firearm. Shot cover 13' keeps the shot in, which may be secured via tube crimp 12', adhesive, hot melt, or other means well known in the art.

20 The improvement of the present invention comprises a compressible member provided at the shot end of the short shot shell, providing a compressible shot shell which compresses when in the magazine to provide

5 increased magazine capacity in conventional arms, but uncompresses when removed from the magazine to simulate traditional length shells for autofeeding and like manipulation in automatic or semi-automatic arms.

While the present system is taught particularly for use with shotguns or the like, it is strongly iterated that this improvement may be utilized in a
10 variety functionally similar applications.

In the present embodiment, the compressible shot shell may be accomplished with a an accordion-style portion of the wad or shell casing which emanates from the shell past the shot, which portion, if part of the wad, is shot from the shell upon use.

15 If part of the wad, the expansion component can be compressible by virtue of memory formed in the polymer in which it is made, or by other means, for example, a mechanical spring action integrated therein, or even a gas pocket or gas spring which is longitudinally compressible, but which expands when there is not pressure applied thereto.

20 Other possible compressible means could comprise a foam or polymer portion attached to the conventional short (Aquila) shell via adhesive or other releasable attachment, to convert the off-the-shelf shell into a shell useable

5 with conventional automatic and semi-automatic firearms.

In Figure 3, the first embodiment 15 of the present invention illustrates a helical spring 16 having an end 17 and an inner diameter 17' which first end 17 may be adhesively mounted or otherwise engaged 19 to the shot end of a shortened shell, or alternatively may be removably engaged by the open 10 tube end being crimped over a portion of the first end 17 of spring 16. In such an embodiment, the spring would be ejected from the shell with the contents of the shell when it is fired.

In still another embodiment, the spring 16 may be permanently and integrally attached to the end of the tube and remain on the tube, so that the 15 contents of the shell pass through its inner diameter 17' (in such embodiment the inner diameter 17' of the shell should be commensurate with the inner diameter of the tube forming the shell), therethrough when the shell is fired, thereby providing a shell having the conventional uncompressed length 18 of about 2.5 inches, and a compressed length 18' of about 1.75 inches. 20 Increased magazine capacity is thereby provided, while providing the ability to manipulate the shell in conventional firearms.

Figure 4 illustrates a second embodiment 20 of the present invention,

5 wherein a compressible spring member 21 formed from a band of polymer or metal formed of a plurality of folds 22 having spring memory is mounted 24 on its first end 23 as the compressible member to the load end of the shot shell, via crimping, adhesive or the like. Alternatively, compressible member may be affixed to the wad.

10 Figures 5 and 6 illustrate a third embodiment 25 of the present invention, wherein the load or shot end of the tube is formed to provide a compressible portion 26 comprising a spring of accordion-like folds 27 along its length, shown in a spiral configuration having an inner diameter 27' generally commensurate with that of the enclosure of the shot tube, which
15 could be facilitated by the folds 27 forming the tube being forced outward into a tube configuration by the pressure generated by the firing of the shell.

Alternatively, the compressible portion can be separate from the tube, and removably mounted 28 to same via tube crimp or adhesive, wherein it could be designed to be ejected upon firing of the shell, or remain engaged
20 to the tube with the contents of said tube passing therethrough.

Like the embodiment of Figures 5 and 6, the fourth embodiment 30 of Figures 7 and 8 contemplate a compressible spring portion 31 in the form of

5 a compressible tube of folded 32 material having a bias memory such as, for example, a bellows tube having a plurality of accordion-like folds 32 along its length 33 to form a spring, this embodiment not evidencing the spiral configuration of the third embodiment. Polymer or like material could be utilized to form this compressible member.

10 Like the third embodiment, however, the compressible tube of the fourth embodiment has an inner diameter 35 generally commensurate with that of the enclosure of the shot tube, which could be facilitated by the folds forming the tube being forced outward 36 into a tube configuration by the pressure generated by the firing of the shell.

15 Alternatively, the compressible portion can be separate from the tube, and removably mounted 34 to same via tube crimp or adhesive, wherein it could be designed to be ejected 37 upon firing of the shell, or alternatively remain engaged to the tube with the contents of said tube passing therethrough.

20 Figures 10 and 11 show a fifth embodiment 45 of the present invention which is a variant of the fourth embodiment, wherein there is provided a compressible tube portion 46 formed of memory resilient material, formed of

5 a plurality of folds 51 along its length 49; which compressible tube portion
may include a plug or foam core 47 of resilient compressible material which
exhibits spring bias when compressed 52 such as polyurethane foam or the
like, so as to form a foam spring. The foam core is ejected 48 from the tube
when the shell is fired, along with the contents of the shell. Alternatively,
10 instead of foam core 47, the compressible tube portion may be filled with air
and removably capped to form a compressible air spring.

Ideally, the compressible tube portion is formed of the tube forming the
shell and as such would remain with the shell after firing, or it could be
configured to be ejected with the foam core upon firming, in which case it
15 would be removably affixed to the load end of the shell via crimp, adhesive,
releasable weld or the like.

Finally, a sixth embodiment 54 of the invention comprises a
compressible foam extension 55 formed of compressible, memory biased
material such as foam or the like to form another configuration foam spring,
20 which extension is affixed or otherwise removably adhered 56 to the load end
58 of the shot shell, which compressible foam extension would be ejected
from the shell when said shell is fired, along with the contents therein.

5 Alternatively, it could be crimped to the shell and may form part of the shot cover. The compressible foam extension 54 would have an uncompressed length such that, when mounted to a short shot shell, the total length of the shell and extension 57 is commensurate with that of a conventional shell length, such as, for example, 2.5 inches.

10 In use, each of the above embodiments would be anticipated as being loaded and fired in the same manner, with the main distinction being that some embodiments would discharge the compressible extension or portion from the barrel upon firing of the shell, while in other embodiments, the compressible extension or portion would remain part of the shell and be discharged from the firearm with the spent shell. In addition, the compressible element may be utilized as a component for non-lethal use or other use, providing a dual use capability.

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Referring to Figure 9, the shot shell 39 of the present invention is inserted 40 into the magazine 42 of the firearm 41 as would be accomplished with a conventional shell. Continuing with Figures 13 and 14, this process is repeated until a plurality of compressed shot shells 59 are loaded into the magazine. As shown, the magazine 42 for a shotgun typically comprises a

5 tube which receives shells at a first end, and applies spring bias to any shell loaded therein via a spring 69 or the like. This spring bias increases with the number of shells loaded, until the length of the tube forming the magazine has been filled.

10 This spring bias compresses the compressible member on the shot shell of the present invention, reducing its length 64 while subjected to the spring bias and other shells forming their own in the magazine, thereby allowing greater capacity. While a typical capacity for an off the shelf shotgun would be five 2.5 inch shells, it is estimated that utilizing the shot shell of the present invention would increase the capacity to at least six, and possibly 7
15 shells. With a tube extender, the magazine capacity could be further significantly increased.

In use, a shell from the magazine would be loaded as would normally be accomplished utilizing the firearm, with the shell 60 to be dispensed from the magazine 42 removed from same by the firearm, cycled through the litter 20 74, and loaded 61 into the firing chamber 62. As soon as the shell 60 to be dispensed is removed 75 from the magazine by the firearm, the spring bias from the magazine is removed from the shot shell, and the compressible

5 portion of the shot shell de-compresses to form a shell 60' having the length
64' of a conventional shell, allowing proper processing of the shell to the firing
chamber without jamming.

Upon firing of the shell, the compressible extension may be ejected with
the load, in which the remaining fired shell casing 65 is ejected 66 from the
10 firearm, and, in semi-automatic firearms, the next shell to be dispensed is
removed from the magazine for loading, wherein again it expands to
conventional shell length upon removal from the magazine.

Referring to Figures 13 and 14A, in the compressible shot shell 70 with
the integrated compressible portion of the present invention is loaded and
fired as above, but the compressible portion remains a part of the shell casing
15 with the load and contents of the shell passing through the inner diameter 77
of the compressible portion, and the shell 70 with integrated compressible
portion is ejected from the firearm as a single piece for disposal or reloading.

While the above example illustrates use of the present system with a
20 series of similar shells, it is noted that one could mix conventional shot shells
with the compressible shells of the present invention and achieve like results
with increased shell capacity in the magazine, although not as much as if only

5 compressed shells were used.

Recitation of the Elements

	<u>Element</u>	<u>Description</u>
	1,'	shell
	2,'	first, second ends
10	3,'	tube
	4,'	shot
	5,'	wad
	6,'	powder
	7,'	primer
15	8,'	cushion
	9,'	head
	10, 10'	length
	11,'	basewad
	12,'	crimp
20	13,'	shot cover
	14,'	enclosure
	15	first embodiment (fig 3)
	16	helical spring
	17,'	first second ends
25	18	uncompressed length
	19	engaged
	20	second embodiment (figure 4)
	21	accordian compressible plastic shot cover
	22	folds
30	23	first second ends
	24	engaged
	25	third embodiment (fig 5,6)
	26	compressible spiral crimp and twist extension of tube
	27,'	fold, I.D.
35	28	adhered
	29	forced outward
	30	fourth embodiment (fig 7,8)
	31	bellows tube compressible extension of tube
	32	fold
40	33	length
	34	adhered
	35	I.D.
	36	forced outward
	37	ejected
45	38	shell
	40	inserted into
	41	firearm
	42	magazine
	45	fifth embodiment (fig 10, 11)
50	46	compressible extension of tube

5	47	foam core
	48	ejected
	49,'	length
	50	compresses
	51	folds
10	54	sixth embodiment (fig 12)
	55	compressible foam extension
	56	adhered to
	57	uncompressed length, compressed length
	58	load end
15	59	shells
	60	compressed shell
	61	loaded
	62	firing chamber
	64,'	length
20	65	fired shell casing
	66	ejected
	69	spring
	70	alternative shell casing
	74	litter
25	75	removal
	76	collapsible portion
	77	inner diameter

The invention embodiments herein described are done so in detail for exemplary purposes only, and may be subject to many different variations in design, structure, application and operation methodology. Thus, the detailed disclosures therein should be interpreted in an illustrative, exemplary manner, and not in a limited sense.